(12) UK Patent Application (19) GB (11) 2 053 658 A

(21) Application No 8021742
(22) Date of filing 2 Jul 1980
(30) Priority data
(31) 2927704
(32) 9 Jul 1979
(33) Fed Rep of Germany (DE)
(43) Application published
11 Feb 1981
(51) INT CL³
A43B 13/22
(52) Domestic classification
A3B 7C1B
(56) Documents cited
GB 1263960
(58) Field of search
A3B
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(54) **Resilient outsoles**

(57) An outsole for a shoe, particularly a sports shoe made from rubber or another material with rubbery properties and provided at least partly with studs or pins 1 approximately uniformly distributed over the contact surface 5, whereof at least part are inclined with respect to the contact surface, in which the multiple-leg studs or pins are used and at least part of the legs are at an angle of approximately 30° to 120° to one another α and also form an angle of approximately 10° to 85° with the bottom of the outsole, β.

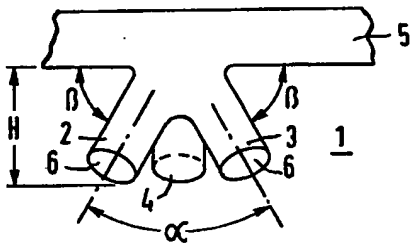

FIG. 5

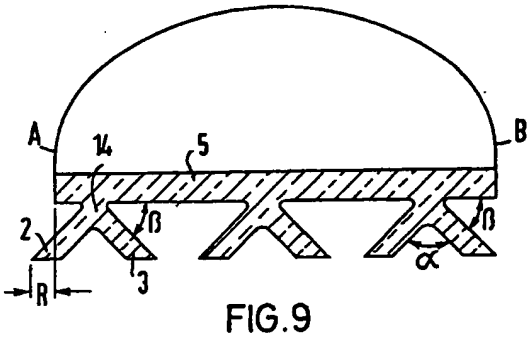

FIG.9

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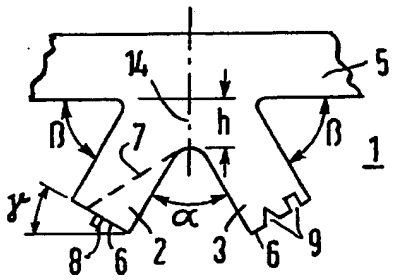

FIG. 1

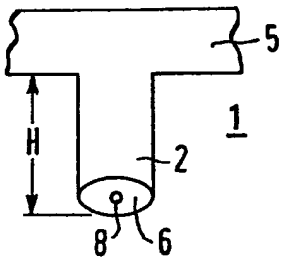

FIG. 2

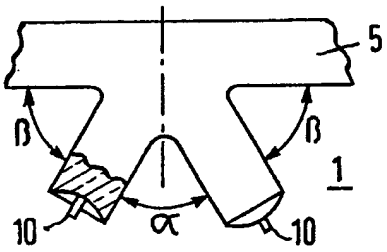

FIG. 3

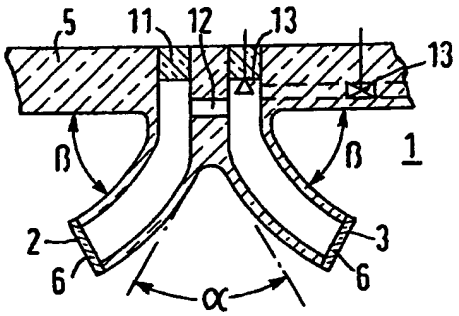

FIG. 4

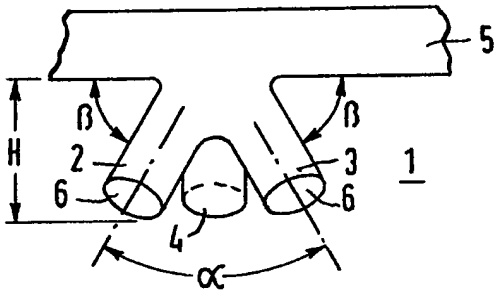

FIG. 5

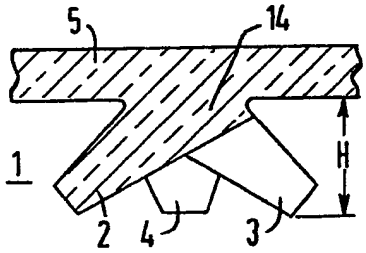

FIG. 7

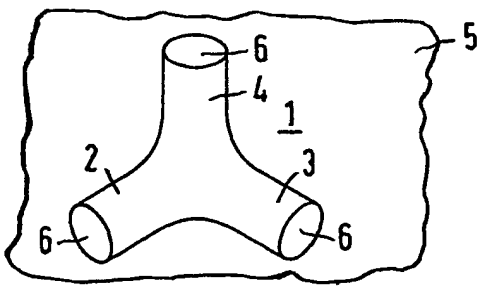

FIG. 6

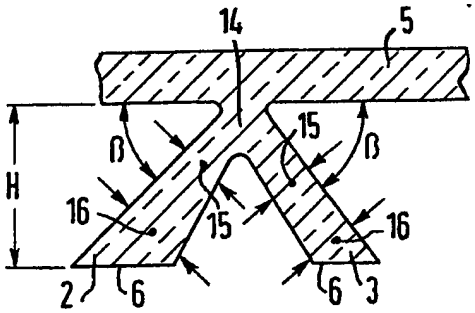

FIG. 8

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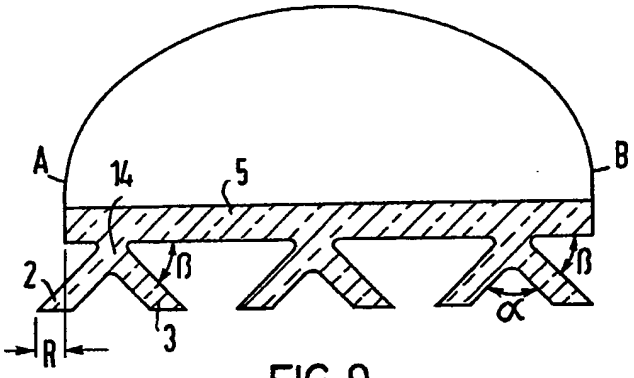

FIG.9

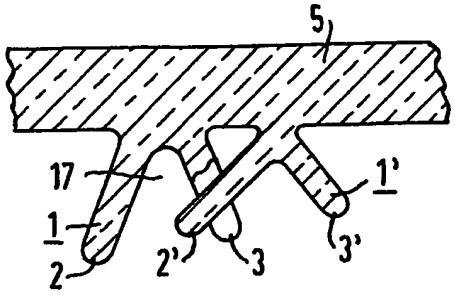

FIG. 10

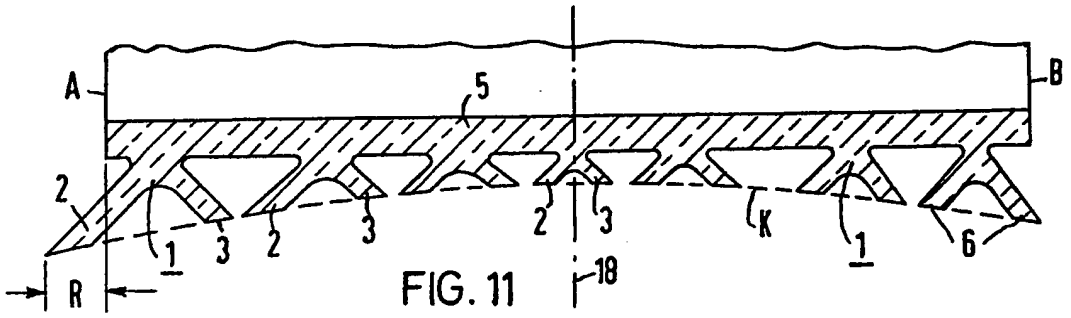

FIG. 11

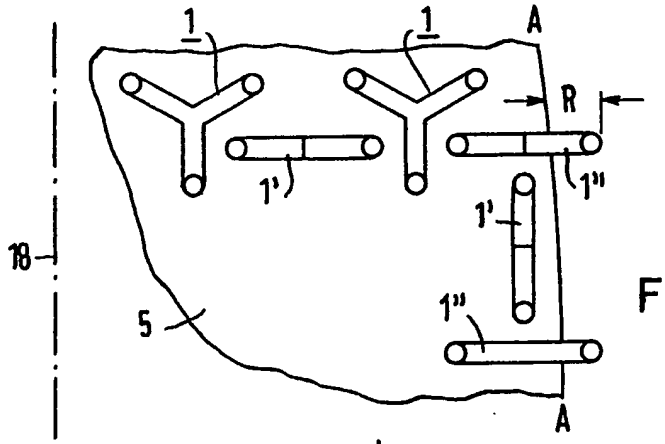

FIG. 12

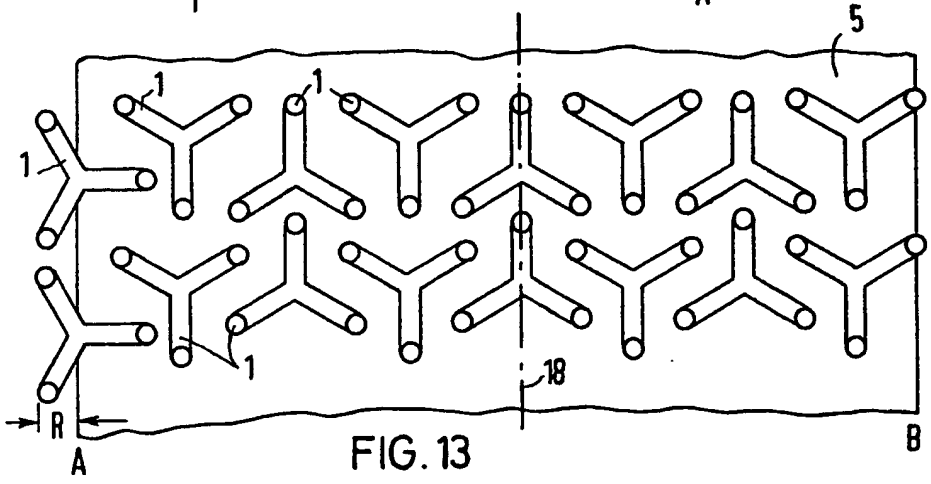

FIG. 13

SPECIFICATION

Outsole for shoes, particularly sports shoes made of rubber or some other material with rubbery properties

The invention relates to an outsole for shoes, particularly sports shoes made from rubber or some other material with rubbery properties, and provided at least partly with studs or pins approximmately uniformly distributed over the contact surface whereof at least part are inclined with respect to the contact surface.

Outsole of this type are known from German Utility model 16 34 279. In the known outsoles only the peripheral studs on either side with respect to the outsole surface are fitted in sloping manner, so that on applying a load, accompanied by the cambering of the sole, the bearing surfaces of the peripheral studs come to rest in one plane with the other studs and thereby provide a certain protection against slipping. However, it is being found that in view of the many ways in which sports shoes can be used on in part widely differing ground surfaces such measures do not offer an adequate gripping action, and in particular lateral stability.

The problem of the invention is to so provide an outsole of the type defined hereinbefore that both the longitudinal direction of the sole and at right angles thereto a maximum of slipping resistance, sole elasticity and lateral stability is obtained, in spite of differing ground conditions. An adequate damping is to be provided which protects the runner from excessive stresses, particularly with a hard ground surface, such as asphalted roads or paths.

According to the present invention in an outsole for a shoe, particularly a sport shoe made from rubber or another material of rubber properties and provided at least partly with studs or pins approximately uniformly distributed over the contact surface whereof at least part of the studs or pins are inclined with respect to the contact surface, multiple-leg studs or pins are used and at least part of the legs are at an angle of approximately 30° - 120° to one another and also form an angle of approximately 10° - 85° at the bottom of the outsole.

Various preferred embodiments of the invention are set forth in the sub claims.

An adequate damping action is ensured by the multiple-leg construction of the studs or pins and the inclination thereof to the base of the sole and this applies even in the case of relatively hard and consequently abrasion-proof stud material. It even applies if the intermediate sole provided between the outsole and the insole in known sports shoes is completely omitted or is made thinner than is normally the case. Thus, a shoe, particularly a sports shoe, provided with the outsole according to the invention is characterized by a comparatively low weight, because the intermediate sole must extend over at least a considerable part of the entire outsole surface. Due to the possibility of tilting the multiple-leg studs or pins in the manner of a spring leg an excellent lateral stability is obtained, which is particularly advantageous when running round bends in sporting competitions.

Due to the spring leg-like tiltability of the multiple-leg studs or pins the angle between the stud legs or between the stud legs and the outsole is varied on loading and load removal, so that dirt is not held in the gussets. Thus, with the outsole according to the invention an excellent self-cleaning effect is obtained.

Further details and advantages of the invention can be gathered from the following drawings, wherein show:

Fig. 1 – a two-leg stud or pin on a large scale and in elevation.

Fig. 2 – a side view rotated by 90°

Fig. 3 – a larger scale elevation of a two-leg stud pin, one leg having a concave contact surface and the other leg a convex contact surface.

Fig. 4 – a large scale section through a two-leg stud or pin with hollow, outwardly tilted legs

Fig. 5 – a three-leg stud or pin with cylindrical legs in a larger scale elevation.

Fig. 6 – a corresponding view from below of the contact surface of an outsole equipped with such studs or pins.

Fig. 7 – a larger scale elevation of a three-leg stud or pin with frusto-conical shaped leg.

Fig. 8 – a larger scale view of a two-leg stud or pin with frusto-conical shaped legs in which the large cone base passes into the leg contact surface.

Fig. 9 – a diagrammatic cross-sectional view through a shoe with two-leg studs or pins and projecting perpheral legs.

Fig. 10 – a perspective, large scale view of two two-leg studs or pins in which one leg is directed towards or projects into a gusset formed by the two legs of the adjacent stud or pin.

Fig. 11 – a cross section through an outsole with asymetrical legs, the longest leg being positioned along the edges of the sole and the shortest legs in the zone along the longitudinal axis of the sole.

Fig. 12 – a view of a sole cutout directed towards the sole contact surface with the arrangement of mixed-leg studs or pins.

Fig. 13 – an outsole with three-leg studs or pins arranged in rows.

Figs. 1 and 2 show a single stud or pin 1 having two cylindrical legs 2 and 3 forming with one another an angle α of approximately 60° and with the base of outsole 5 an angle β of 60°. These angles can vary relatively widely, particularly as a function of the hardness of the stud material, the leg length and cross section or similar parameters. Thus, for the angle α it can vary between in particular 30° and 120° and for the angle between 10° and 85°. In the present embodiment the angle γ which defines the slope of the contact surface 6 of legs 2 and 3 relative to the horizontal or tread surface is approximately 30°. However, as a function of the intended use it can vary by approximately ± 15°. It is also possible to slope the legs 2 and 3 in accordance with the broken line 7 in Fig. 1, providing in this way frusto-conical stud legs. The degree of elasticity of the studs or pins 1 can be controlled by measures of the aforementioned type and consequently adapted to individual

requirements. Thus, the stud elasticity depends not only on the material used, but is also mainly dependent on the shape component, such as the nature and length of the studs and of the angle α formed by them. A greater shock absorption is ensured by larger stud legs and a larger angle α between the stud legs.

The contact surface 6 of legs 2, 3 can, in the manner shown in Figs. 1 and 2, be provided with button-like projections 8 or with recesses 9 of different cross-sectional shapes in order to further increase the gripping power of the studs or pins 1. As can be seen from the left-hand part of Fig. 3 for the same purpose the contact surfaces can be made concave. Alternatively and in accordance with the right-hand side of Fig. 3 they can be made convex and can in each case be provided with a pin-like projection 10.

According to the embodiment of Fig. 4, legs 2 and 3 have outwardly bent free ends. In order to considerably reduce the weight of a shoe provided with such an outsole the legs 2 and 3 are hollow and the cavities are filled with a pressure medium. The closure is provided by a plug 11. According to another advantageous embodiment of the invention at least part of each of the hollow legs is interconnected by means of a shaped in or on tube system 12, pressure being supplied to the legs from a valve-like member 13. As a function of the ground conditions in this embodiment the elasticity of the legs can additionally be sensitively regulated by adapting the internal pressure of the pressure medium.

Figs. 5 and 6 show the embodiment of a three-leg stud or pin 1, whose inclined legs 2, 3 and 4 are cylindrical. This provides a slip-proof, stable stud or pin 1 in all directions, which also permits a relatively large portion angle when the elasticity is suitably chosen. The latter also applies in the embodiment of Fig. 7 whose legs 2, 3 and 4 are frusto-conical shaped and are connected by their largest base via spacer 14 with outsole 5. In certain cases the spacer 14 can be omitted, because the abutting surface can be made adequately large, due to the inclined position of the legs.

Fig. 8 shows a two-leg stud or pin 1 in which the two legs 2 and 3 are also frusto-conically shaped. Unlike in the construction of Fig. 7 in this arrangement the smaller frusto-conical surfaces 15 are joined in spacer 14, whilst the larger frusto-conical surfaces 16 pass into the particular leg contact surface 6. In not shown manner the contact surfaces 6 can be inclined in such a way that they engage full and square on the base. Both the frusto-conical shaped legs can have the same dimensions but, as shown in Fig. 8, can also be of different size. As a result the elasticity of the studs or pins can be adapted to different uses.

Fig. 9 is a cross-sectional diagrammatic view of a shoe having an outsole 5, whose outer edge is A and whose inner edge is B. To enlarge the tread surface of the shoe the outer leg 2 of the outermost left hand stud is arranged in such a way that its free end projects beyond the upper or sole edge A. In the present case leg 2 projects by R beyond edge A. In an extreme case the dimension R can be selected in such a way that the left-hand edge of spacer 14 is aligned with the outer edge A of outsole 5.

In cases where a maximum tread surface is desired the leg ends arranged along the inner edge B can also project beyond the latter, but in this case the projecting length R should be less than on the outside A.

Fig. 10 is a perspective arrangement of two leg-studs or pins 1 and 1'. The two legs 2 and 3 of stud or pin 1 form a gusset 17 into which at least partly projects the leg 2' of stud or pin 1'. Thus the advantage of a high self-cleaning action is obtained, because any dirt which may have been deposited in gusset 17 is forced out or at least loosened on loading the outsole 5 by the leg 2' advancing in the direction of gusset 17.

Figs 11 shows an outsole 5 provided with studs or pins 1 with legs 2 and 3 of different lengths and whose leg contact surfaces 6 are on a path K convex with respect to the tread surface.

Instead of being located on a curved path K the contact surface 6 could be located on the sides of a obtuse angle, whose apex would be in the vicinity of the outsole longitudinal axis.

An outsole according to Fig. 11 has a particularly high shock absorption, because the spring-leg-like tilting of the studs or pins 1 is further aided by the resilience of outsole 5 from its outer edges to its centre.

Fig. 12 shows a sole cutout in the direction of the contact surface of sole 5, the outside being provided with mixed-leg contact surface of sole 5, the outsole being provided with mixed-leg studs or pins 1. It is advantageous to arrange the two and three-leg studs or pins 1 in rows or to fit only two-leg studs or pins 1 in rows.

In the embodiment of Fig. 12 the three-leg studs or pins are designated 1 and the two leg studs or pins 1'. In a transverse location with respect to the longitudinal axis 18 of the sole the two-leg studs or pins can also be used with the peripheral studs or pins 1' projecting by amount R.

Fig. 13 shows an embodiment for the arrangement of three leg studs or pins 1 in rows in the direction of the longitudinal axis 18 and in rows at right-angles thereto. Two of the three leg studs or pins 1 are used as peripheral legs on the sole edge A, so that an extremely large contact surface and consequently a high degree of slipping resistance and stability are obtained.

For strength reasons the height h of spacer 14 should be at least 1 to 2 mm. The height h of the stud legs 2, 3, or 4 is preferably 3 to 15 mm.

The studs or pins 1 preferably form a unit with the outsole 5. However, it is fundamentally also possible in the case of outsoles produced by moulding to separately place the studs or pins 1 in the mould and pour the outsole material round them.

If the studs or pins 1 are arranged in parallel rows at right-angles to the longitudinal axis 18 of two adjacent rows to be staggered to prevent a reciprocal influence thereof when the stud legs are tilted under load.

The outsole according to the invention is particularly suitable for long-distance running on difficult ground and in particular for cross-country running.

However, it can also be advantageously used for keep fit, jogging and training purposes of the most varied type.

CLAIMS:

1. An outsole for a shoe, particularly a sports shoe made from rubber or another material with rubbery properties and provided at least partly with studs or pins approximately uniformly distributed over the contact surface, whereof at least part of the studs or pins are inclined with respect to the contact surface, in which multiple-leg studs or pins are used and at least part of the legs are at an angle of approximately 30° to 120° to one another and also form an angle of approximately 10° to 85° with the bottom of the outsole.

2. An outsole as claimed in claim 1, in which the studs or pins and/or the stud legs have the same length.

3. An outsole as claimed in claim 1, in which at least part of the studs or pins and/or the stud legs have unequal lengths.

4. An outsole as claimed in any one of claims 1 to 3, in which at least part of the studs or pins have a different slope angle to the bottom of the outsole.

5. An outsole as claimed in any one of claims 1 to 4, in which the studs or pins have a round geometrical cross-section shape, for example a circular or elliptical shape.

6. An outsole as claimed in any one of claims 1 to 4, in which the studs or pins have polygonal cross-section shapes, for example triangular, quadrangular or hexagonal.

7. An outsole as claimed in one of claims 1 to 6 in which the studs or pins have an elongated shape.

8. An outsole as claimed in any one of claims 1 to 6 in which the studs or pins have a curved shape.

9. An outsole as claimed in claim 8 in which the legs of the studs or pins are curved in such a way that their contact surfaces are directed outwards.

10. An outsole as claimed in claim 1 in which the cross sectional surface of the stud or pin legs on the side remote from the bottom of the outsole is larger than on the side facing the bottom of the outsole.

11. An outsole as claimed in claim 1 in which the legs of the studs or pins are constructed in the form of a cone or frustrum, the base surface thereof passing into the leg contact surface.

12. An outsole as claimed in claim 1 in which the contact surface of the stud or pin legs is provided with button or rod-like projections.

13. An outsole as claimed in claim 1 in which the contact surface of the stud or pin legs is provided with recesses.

14. An outsole as claimed in claim 1 in which the contact surface of the stud or pin legs is concave.

15. An outsole as claimed in claim 1 in which the contact surface of the stud or pin legs is convex.

16. An outsole according to any one of claims 1 to 15 in which at least certain of the legs of the studs or pins are hollow.

17. An outsole as claimed in claim 16 in which at least one leg of the multiple-leg studs or pins is provided with a valve-like member.

18. An outsole as claimed in claim 16 in which at least part of the hollow stud or pin legs are interconnected in groups by air ducts and each group is provided with only a single valve like member.

19. An outsole as claimed in one of claims 1 to 18 which is at least partly provided with differingly long, multiple-leg studs or pins over the entire outsole width whereof the longest studs are located in the peripheral areas of the outsole and the shorter studs in the area of the longitudinal axis thereof.

20. An outsole as claimed in any one of claims 1 to 19 in which the stud or pin legs located in the outer peripheral area of the outsole project beyond the edge of the latter.

21. An outsole as claimed in any one of claims 1 to 20 which is at least partly provided with studs or pins with the same and/or different numbers of legs.

22. An outsole as claimed in claim 1 in which adjacent multiple leg studs or pins are associated with one another in such a way that a free-leg end of one stud or pin is moveable, on loading the outsole, in the direction of a gap formed by the two legs of an adjacent stud or pin.

23. An outsole substantially as described herein with reference to and as shown in the accompanying drawings.

New claims or amendments to claims filed on 10th November 1980.

Superseded claims 1 to 23.

1. Outsole for a shoe, particularly a sports shoe made from rubber or another material with rubbery properties and provided at least partly with studs or pins approximately uniformly distributed over the contact surface, whereof at least part is inclined with respect to the base surface of the outsole, in which the studs or pins are constructed in multiple-leg form and that the legs belonging to one stud or pin diverge from one another and form an angle of less than 90° with the base surface of the outsole.

2. An outsole as claimed in claim 1, in which in the sole edge area at least one of the legs of the studs or pins is so directed relative to the sole edge that on loading the sole the sole base area is enlarged through the deformation of said leg.

3. An outsole as claimed in claim 1 or claim 2 in which in the case of a two legged stud or pin construction the plane passing through the two legs is substantially perpendicular to the longitudinal axis of the sole.

4. An outsole as claimed in claim 1, claim 2 or claim 3 in which the stud or pins and/or the stud legs have the same length.

5. An outsole as claimed in claim 1 claim 2 or claim 3 in which at least part of the studs or pins and/or the sud legs have unequal lengths.

6. An outsole as claimed in any one of claims 1 to 5, in which at least part of the studs or pins have a different slope angle to the bottom of the outsole.

7. An outsole as claimed in any one of claims 1 to 6, in which the studs or pins have a round geometrical cross-section shape, for example a circular or elliptical shape.

8. An outsole as claimed in any one of claims 1 to 7, in which the studs or pins have polygonal cross-section shapes, for example triangular quadrangular

or hexagonal.

9. An outsole as claimed in one of claims 1 to 8 in which the studs or pins have an elongated shape.

10. An outsole as claimed in any one of claims 1 to 9 in which the studs or pins have a curved shape.

11. An outsole as claimed in claim 10 in which the legs of the studs or pins are curved in such a way that their contact surfaces are directed outwards.

12. An outsole as claimed in claim 1, claim 2 or claim 3 in which the cross sectional surface of the stud or pin legs on the side remote from the bottom of the outsole is larger than on the side facing the bottom of the outsole.

13. An outsole as claimed in claim 1, claim 2 or claim 3 in which the legs of the studs or pins are constructed in the form of a cone of frustum, the base surface thereof passing into the leg contact surface.

14. An outsole as claimed in claim 1, claim 2 or claim 3 in which the contact surface of the stud or pin legs is provided with button or rod-like projections.

15. An outsole as claimed in claim 1, claim 2 or claim 3 in which the contact surface of the stud or pin legs is provided with recesses.

16. An outsole as claimed in claim 1, claim 2 or claim 3 in which the contact surface of the stud or pin legs is concave.

17. An outsole as claimed in claim 1, claim 2 or claim 3 in which the contact surface of the stud or pin leg is convex.

18. An outsole according to any one of claims 1 to 17 in which at least certain of the legs of the studs or pins are hollow.

19. An outsole as claimed in claim 18 in which at least one leg of the multiple-leg studs or pins is provided with a valve-like member.

20. An outsole as claimed in claim 18 in which at least part of the hollow stud or pin legs are interconnected in groups by air ducts and each group is provided with only a single valve like member.

21. An outsole as claimed in any one of claims 1 to 20 which is at least partly provided with differingly long, multiple-leg studs or pins over the entire outsole width whereof the longest studs are located in the peripheral areas of the outsole and the shorter studs in the area of the longitudinal axis thereof.

22. An outsole as claimed in any one of claim 1 to 21 in which the stud or pin legs located in the outer peripheral area of the outsole project beyond the edge of the latter.

23. An outsole as claimed in any one of claims 1 to 22 which is at least partly provided with studs or pins with the same and/or different numbers of legs.

24. An outsole as claimed in claim 1, claim 2 or claim 3 in which adjacent multiple leg studs or pins are associated with one another in such a way that a free-leg end of one stud or pin is moveable, on loading the outsole, in the direction of a gap formed by the two legs of an adjacent stud or pin.

25. An outsole substantially described herein with reference to and as shown in the accompanying drawings.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1981.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.